

## 299-E26-60 (A6653) Log Data Report

### Borehole Information:

<b>Borehole:</b> 299-E26-60 (A6653)		<b>Site:</b> 216-A-24 Crib			
<b>Coordinates (WA St Plane)</b>		<b>GWL<sup>1</sup> (ft):</b> None		<b>GWL Date:</b> 08/15/05	
<b>North (m)</b> 136353.356	<b>East (m)</b> 575623.026	<b>Drill Date</b> 07/81	<b>Ground Level Elevation</b> 706.02	<b>Total Depth (ft)</b> 54	<b>Type</b> Cable

### Casing Information:

<b>Casing Type</b>	<b>Stickup (ft)</b>	<b>Outer Diameter (in.)</b>	<b>Inside Diameter (in.)</b>	<b>Thickness (in.)</b>	<b>Top (ft)</b>	<b>Bottom (ft)</b>
Welded steel	3.4	6 5/8	6 1/8	1/4	3.4	54

### Borehole Notes:

The logging engineer measured the casing diameter using a caliper and steel tape. Logging data acquisition is referenced to the top of casing.

### Spectral Gamma Logging System (SGLS) Equipment Information:

<b>Logging System:</b> Gamma 1E	<b>Type:</b> SGLS (70%) SN: 34TP40587A
<b>Effective Calibration Date:</b> 03/04/05	<b>Calibration Reference:</b> DOE-EM/GJ864-2005
<b>Logging Procedure:</b> MAC-HGLP 1.6.5, Rev. 0	

### High Rate Logging System (HRLS) Equipment Information:

<b>Logging System:</b> Gamma 1C	<b>Type:</b> HRLS SN: 39-A314
<b>Effective Calibration Date:</b> 04/06/05	<b>Calibration Reference:</b> DOE-EM/GJ865-2005
<b>Logging Procedure:</b> MAC-HGLP 1.6.5, Rev. 0	

### Spectral Gamma Logging System (SGLS) Log Run Information:

<b>Log Run</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4 Repeat</b>	
Date	08/15/05	08/15/05	08/15/05	08/15/05	
Logging Engineer	Spatz	Spatz	Spatz	Spatz	
Start Depth (ft)	53.5	35.5	16.5	13.5	
Finish Depth (ft)	35.5	16.5	3.5	3.5	
Count Time (sec)	100	20	100	100	
Live/Real	R	R	R	R	
Shield (Y/N)	N	N	N	N	

Log Run	1	2	3	4 Repeat	
MSA Interval (ft)	1.0	1.0	1.0	1.0	
ft/min	N/A <sup>2</sup>	N/A	N/A	N/A	
Pre-Verification	AE093CAB	AE093CAB	AE093CAB	AE093CAB	
Start File	AE094000	AE094019	AE094039	AE094053	
Finish File	AE094018	AE094038	AE094052	AE094063	
Post-Verification	AE094CAA	AE094CAA	AE094CAA	AE094CAA	
Depth Return Error (in.)	N/A	N/A	0	0	
Comments	No fine-gain adjustment.	No fine-gain adjustment.	No fine-gain adjustment.	No fine-gain adjustment.	

### **High Rate Logging System (HRLS) Log Run Information:**

Log Run	5	6 Repeat	7		
Date	08/30/05	08/30/05	08/30/05		
Logging Engineer	Spatz	Spatz	Spatz		
Start Depth (ft)	43.5	25.5	21.5		
Finish Depth (ft)	16.5	18.5	19.5		
Count Time (sec)	300	300	300		
Live/Real	R	R	R		
Shield (Y/N)	N	N	Y (internal)		
MSA Interval (ft)	1.0	1.0	1.0		
ft/min	N/A	N/A	N/A		
Pre-Verification	AC141CAB	AC141CAB	AC141CAB		
Start File	AC141000	AC141028	AC141036		
Finish File	AC141027	AC141035	AC141040		
Post-Verification	AC141CAA	AC141CAA	AC141CAA		
Depth Return Error (in.)	0	0	0		
Comments	No fine gain adjustment.	No fine gain adjustment.	No fine gain adjustment.		

### **Logging Operation Notes:**

Logging was conducted with a centralizer on each sonde. Measurements are referenced to the top of casing. Repeat sections were collected in this borehole for both systems to evaluate the performance of the logging systems. An internal shield was used on the HRLS for the highest activity zone from 19.5 to 21.5 ft.

### **Analysis Notes:**

<b>Analyst:</b>	Henwood	<b>Date:</b>	09/06/05	<b>Reference:</b>	GJO-HGLP 1.6.3, Rev. 0
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Pre-run and post-run verifications for the logging systems were performed before and after data acquisition. Acceptance criteria were met for the SGLS. The control limits and HASQUARD limits were exceeded for the pre- and post-verification measurements, respectively, for the HRLS. A decrease in the efficiency (net counts per second) during the day suggests the <sup>137</sup>Cs concentrations are slightly underestimated. The data are provisionally accepted.

A casing correction for 1/4-in.-thick casing was applied to the spectral log data (SGLS and HRLS).

SGLS and HRLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated with EXCEL worksheet templates identified as G1EMar05.xls for the SGLS and G1CApr05.xls for the HRLS using efficiency functions and corrections for casing, water, and dead time as determined from annual calibrations. Dead time corrections are applied where dead times exceed approximately 11 percent for both

the SGLS and HRLS. Where SGLS dead time exceeds 40 percent, HRLS data are substituted. No correction for water was necessary.

### **Log Plot Notes:**

Separate log plots are provided for the man-made radionuclide ( $^{137}\text{Cs}$ ) detected in the borehole, naturally occurring radionuclides ( $^{40}\text{K}$ ,  $^{238}\text{U}$ ,  $^{232}\text{Th}$  [KUT]), a combination of man-made, KUT, total gamma, and dead time, and total gamma plotted with dead time. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, casing corrections, or water corrections. Repeat log sections are also included where appropriate.

A comparison plot of the Westinghouse Hanford Company Radionuclide Logging System (RLS) data acquired in 1995 and the current SGLS data is provided.

### **Results and Interpretations:**

$^{137}\text{Cs}$  was detected in this borehole between the ground surface and the bottom of the borehole (53.5 ft). The maximum concentration was measured at approximately 700,000 pCi/g at 20.5 ft in depth.

The comparison plot of RLS data decayed to 2005 and the current SGLS data indicates no significant changes in the profile for  $^{137}\text{Cs}$  since 1995 in most of the borehole. The RLS could not quantify concentrations in excess of approximately 3,000 pCi/g. Therefore, no comparison can be made in the highest activity depth intervals.

The repeat sections for the SGLS and HRLS indicate good agreement.

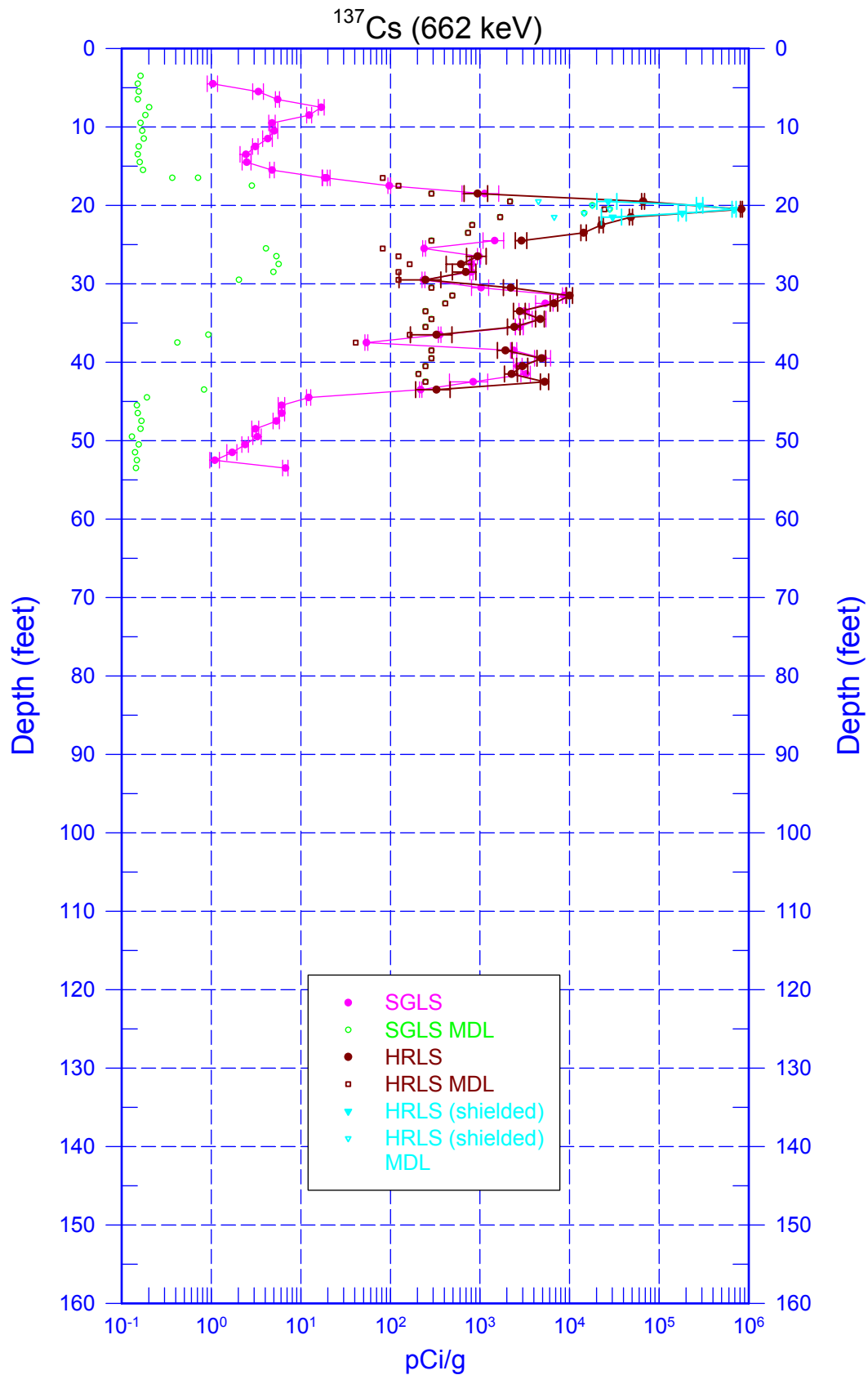
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<sup>1</sup> GWL – groundwater level

<sup>2</sup> N/A – not applicable

# 299-E26-60 (A6653)

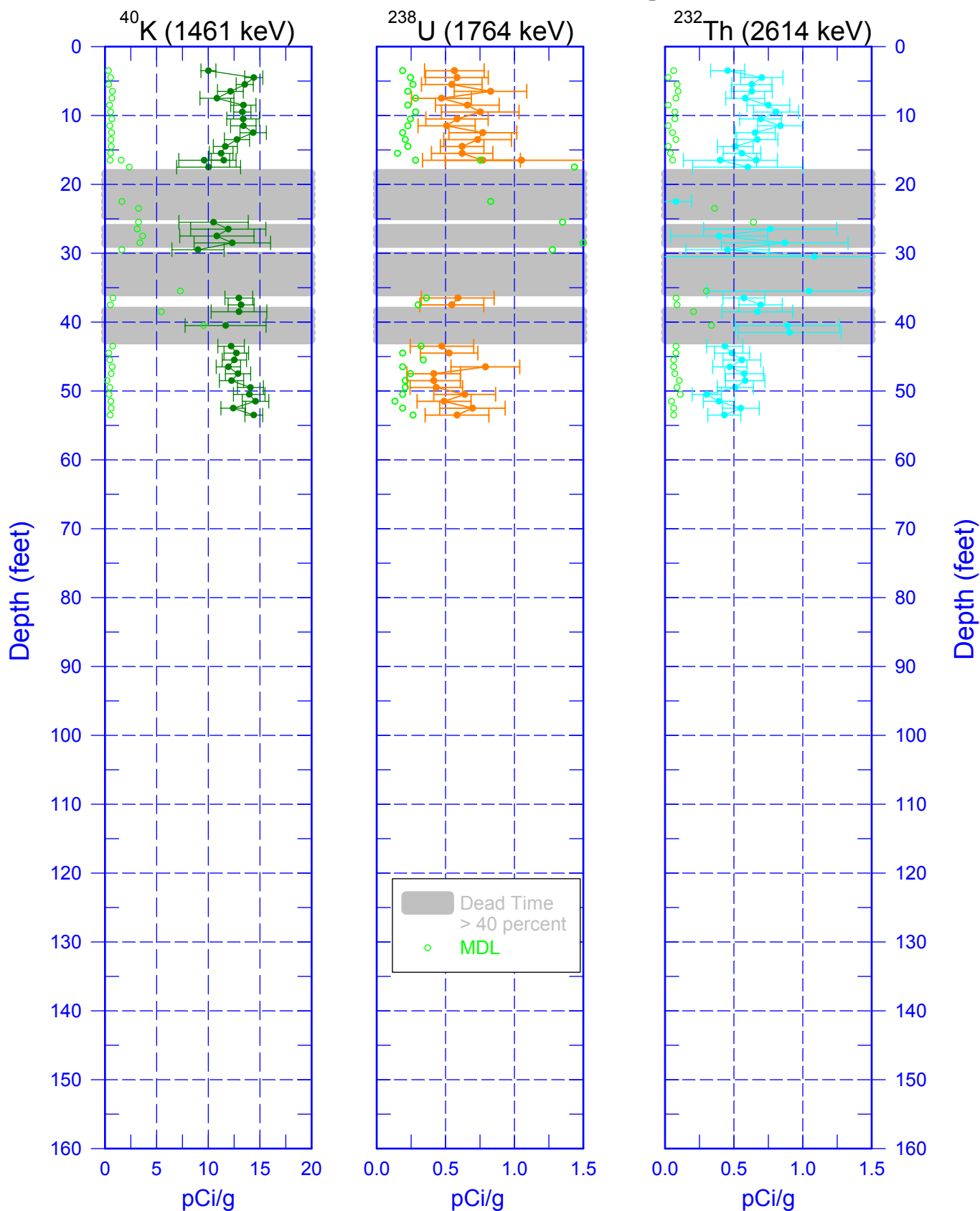
## Man-Made Radionuclides



Zero Reference = Top of Casing

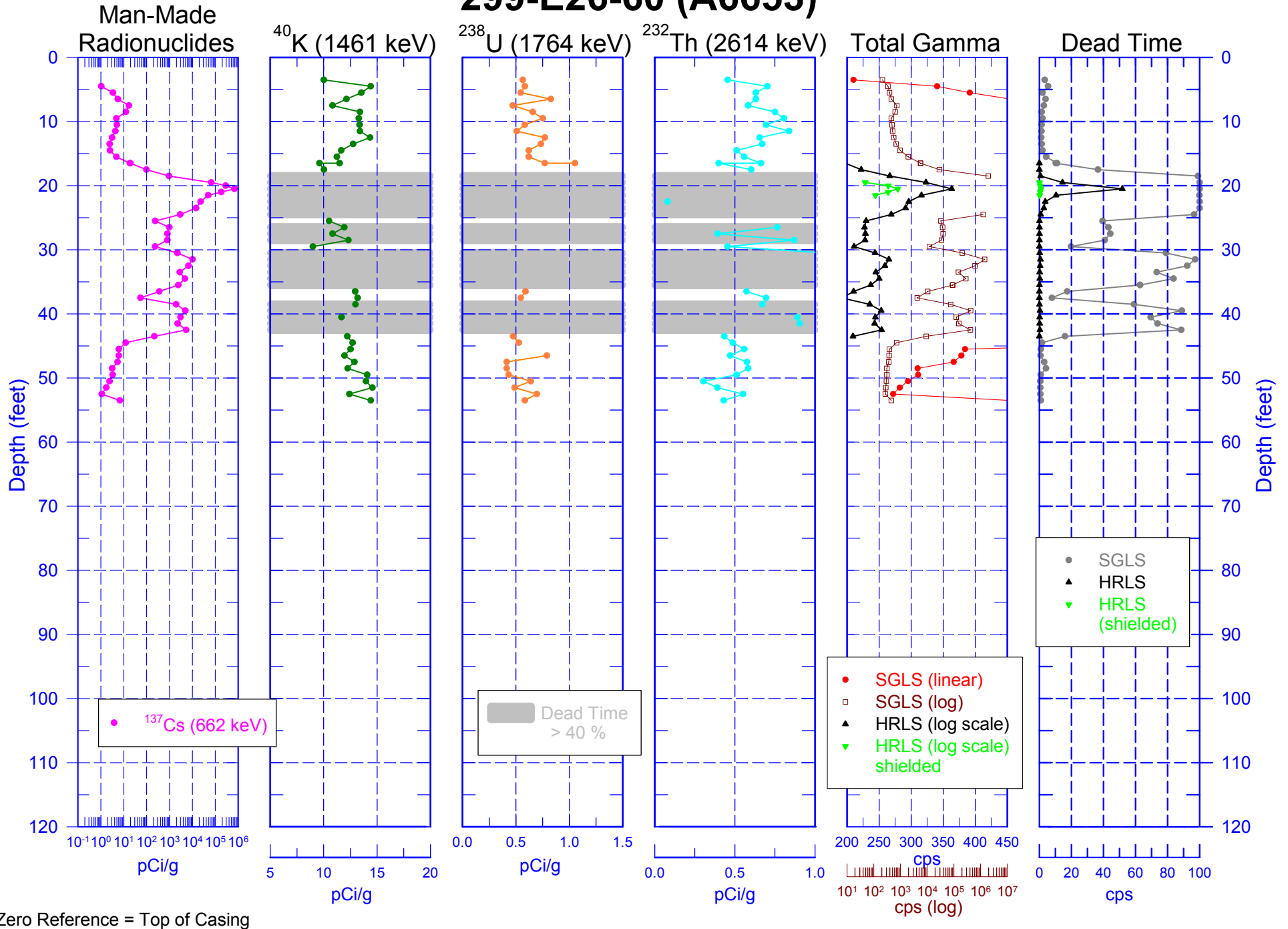
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## Natural Gamma Logs



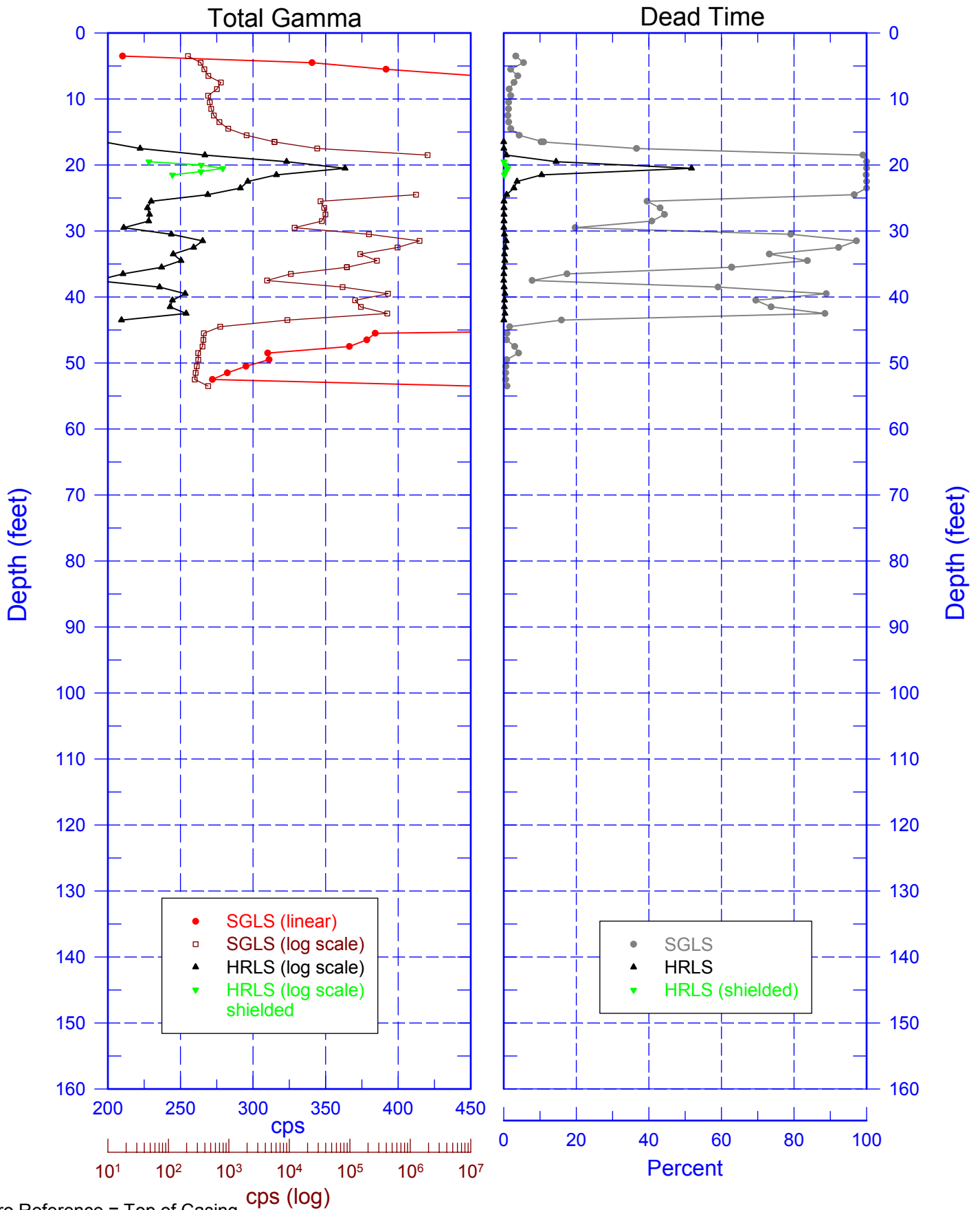
Zero Reference = Top of Casing

# 299-E26-60 (A6653)



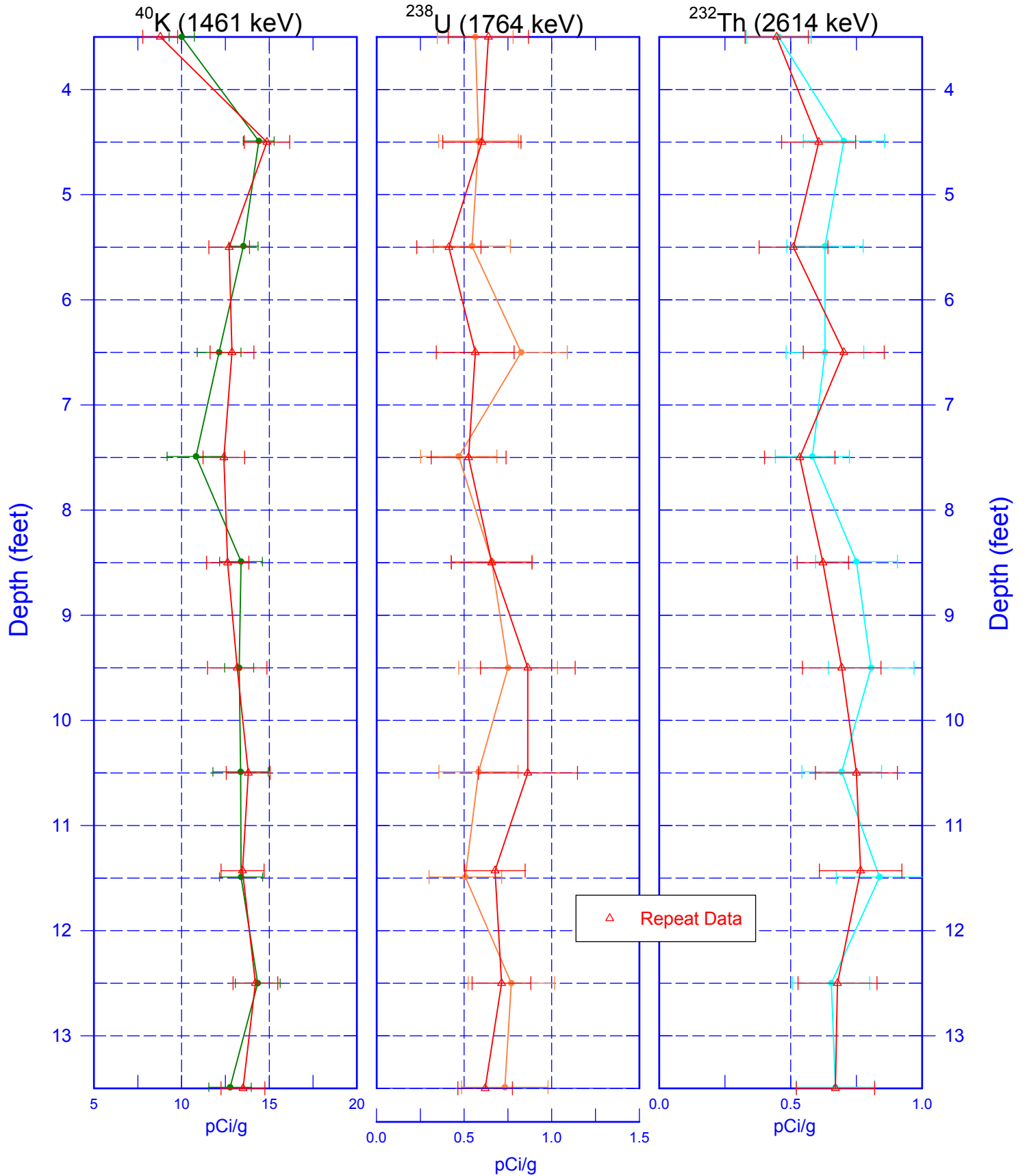
# 299-E26-60 (A6653)

## Total Gamma & Dead Time



# 299-E26-60 (A6653)

## Repeat Section of Natural Gamma Logs

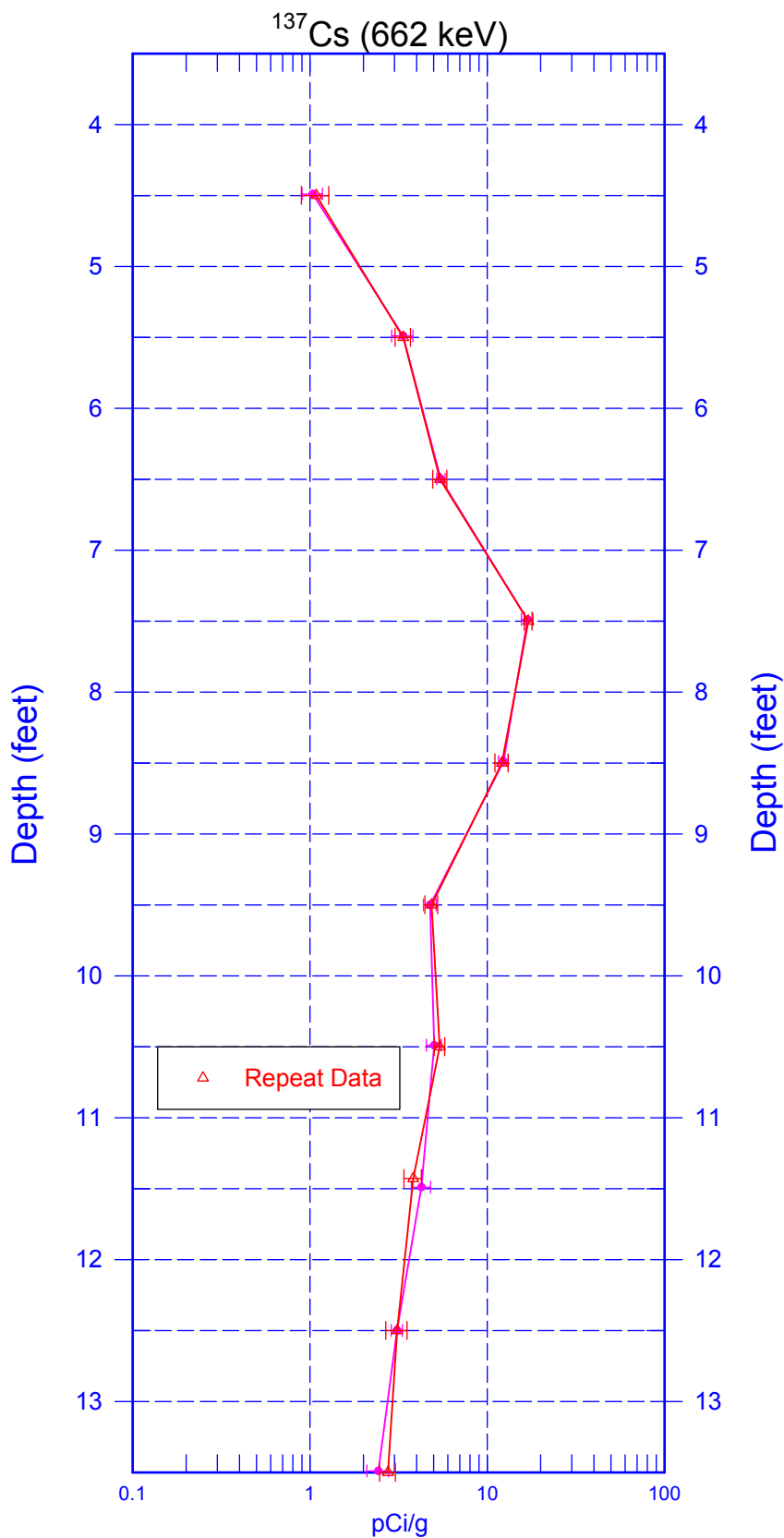


Zero Reference = Top of Casing



# 299-E26-60 (A6653)

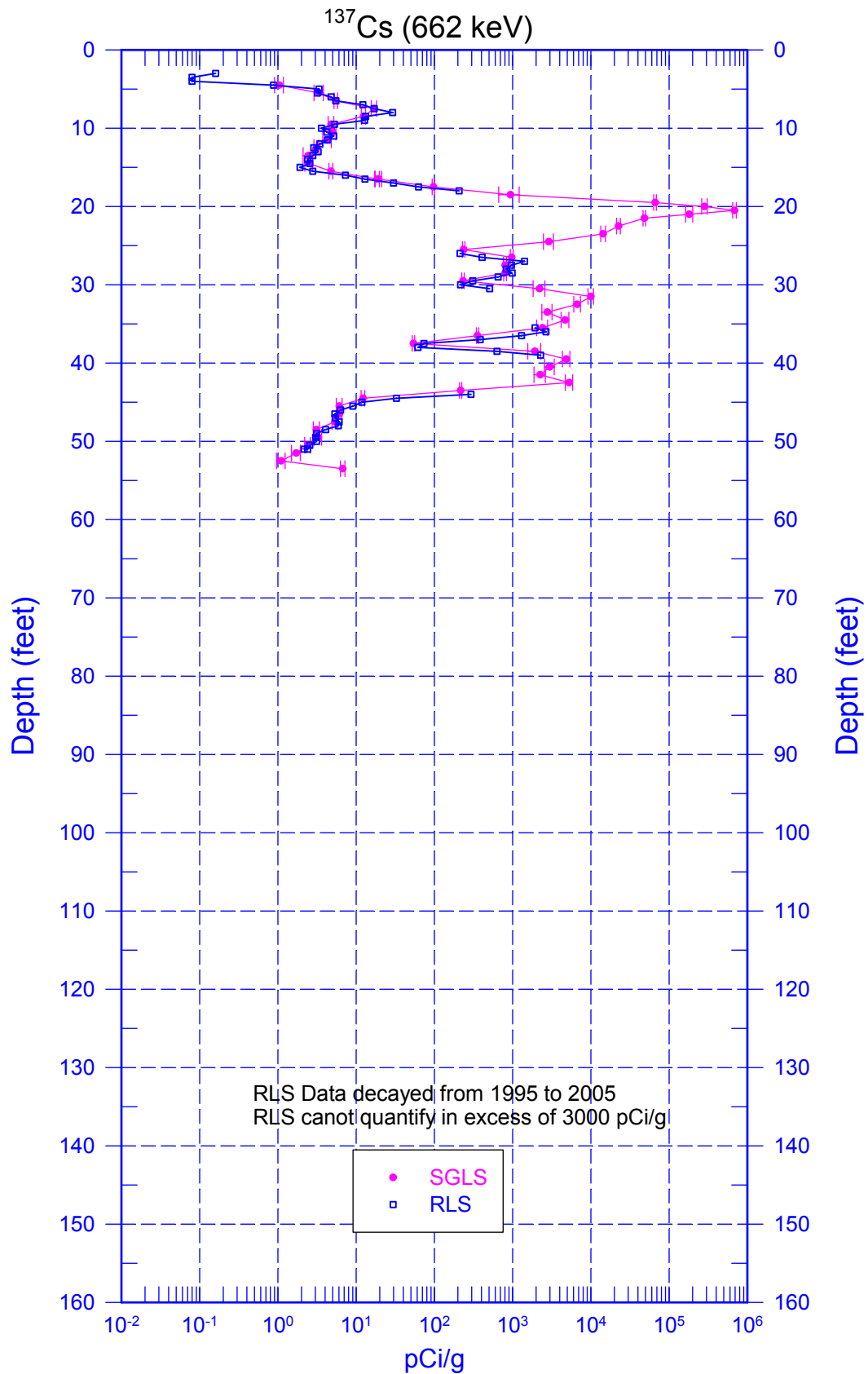
## Repeat Section of Man-Made Radionuclides



Zero Reference = Top of Casing

# 299-E26-60 (A6653)

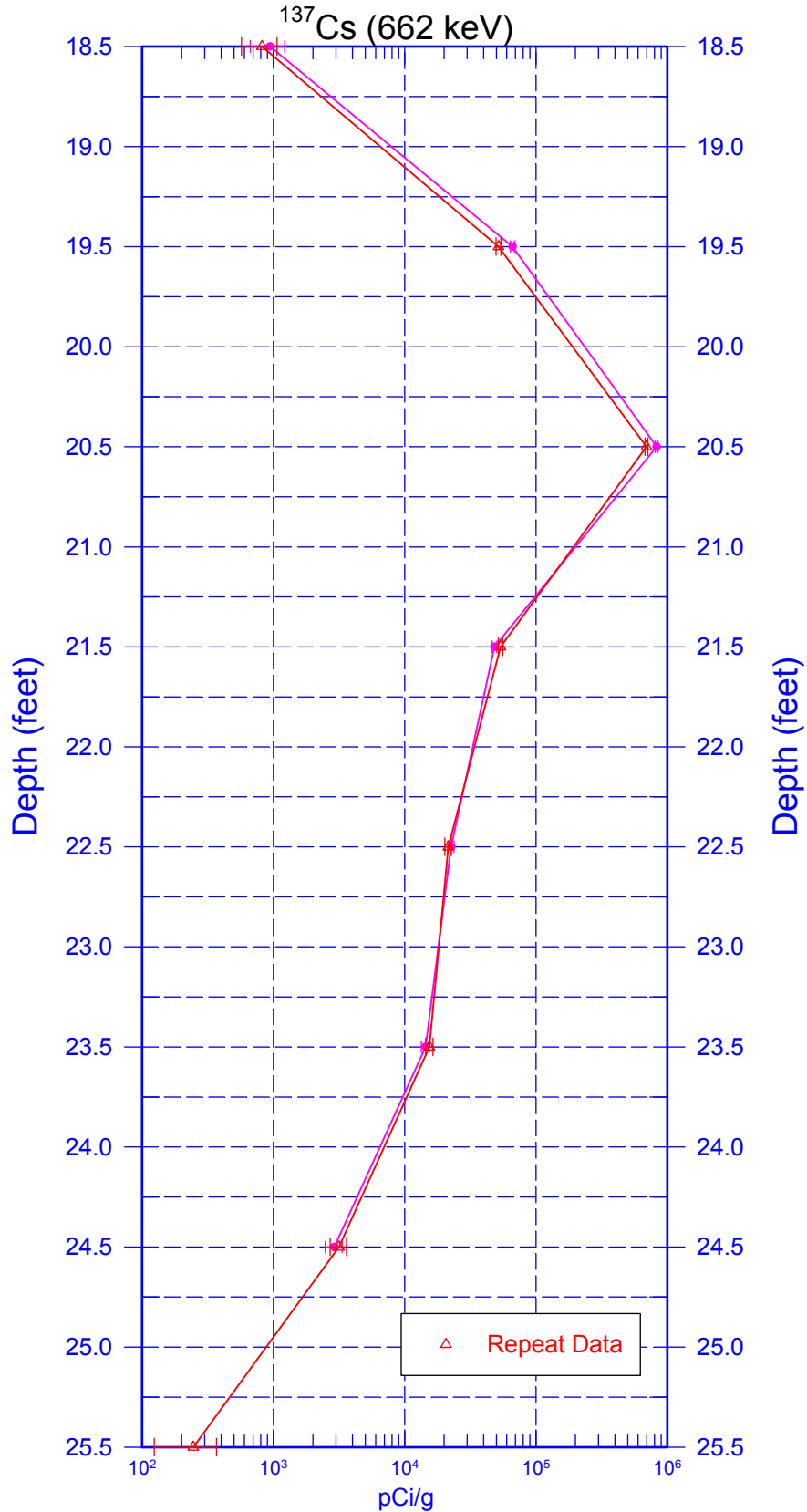
## SGLS & RLS Comparison Plot



Zero Reference = Top of Casing

# 299-E26-60 (A6653)

## Repeat Section of High Rate



Zero Reference = Top of Casing